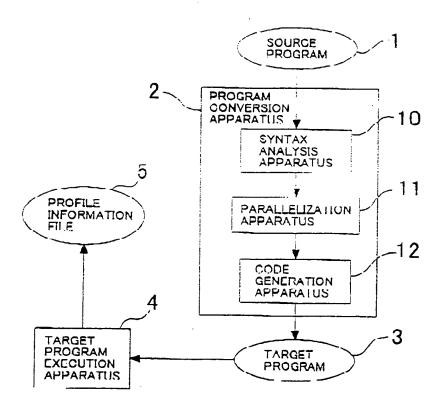
FIG. 1



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FIG. 2

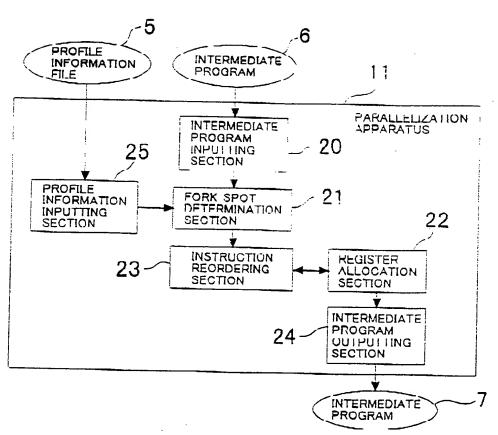


FIG. 3

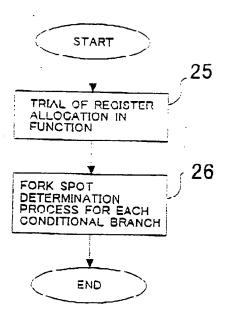


FIG. 4

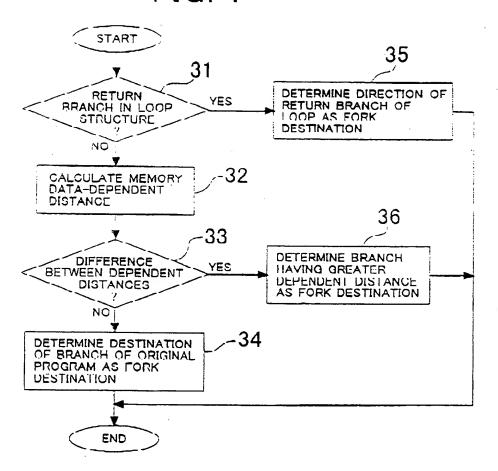


FIG. 5

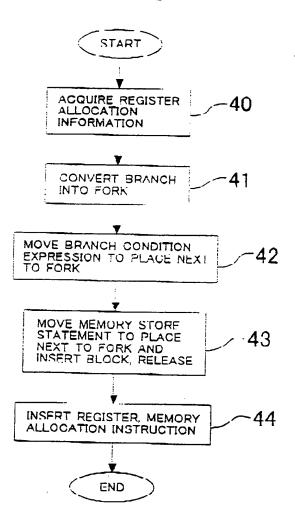


FIG. 6(A)

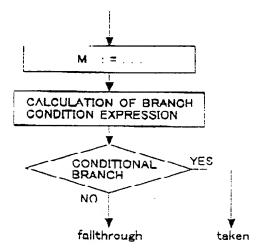


FIG. 6(B)

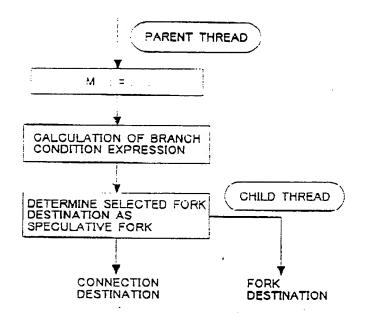


FIG. 6(C)

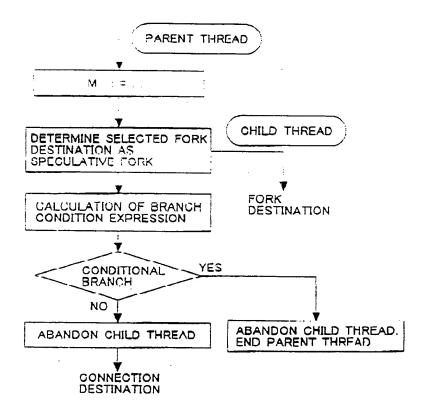


FIG. 6(D)

ì

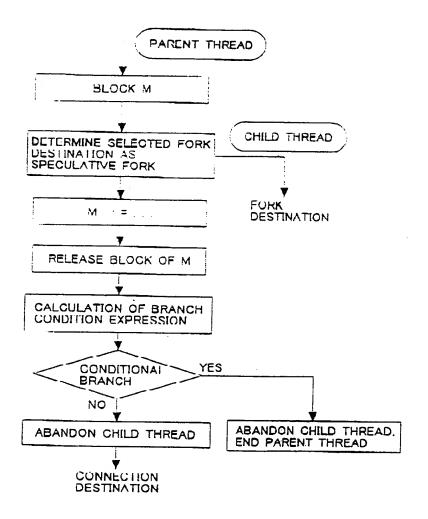
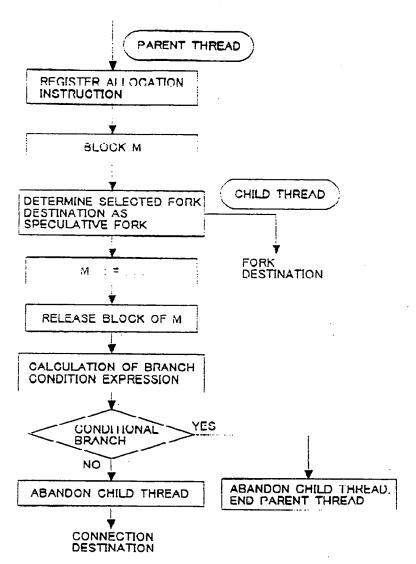


FIG. 6(E)



SPFORK 1	TO CREATE A SPECULATION MODE CHILD THREAD FOR STARTING EXECUTION FROM 1
TTERM c	TO END SELF THREAD AND SETTLE CHILD THREAD IF C
FTERM c	TO END SELF THREAD AND SETTLE CHILD THREAD IF G
THABORT	TO ABANDON A CHILD THREAD OF A SPECULATION MODE
BLACK m	TO DESIGNATE A MEMORY ADDRESS DESIGNATED WITH M AS BLOCK
RELEASE m	TO CLEAR BLOCK SET TO MEMORY ADDRESS DESIGNATED WITH M
DSPIN	TO CREATE A CHILD THREAD CREATED BY SUCCEEDING FURK IN DATA-DEPENDENT SPECULATION MODE
DSPOUT	TO CLEAR DATA-DEPENDENT SPECULATION MODE OF CHILD THREAD
RDCL t	TO INSTRUCT TO ALLOCATE INTERMEDIATE TERMS/ VARIABLES DESIGNATED WITH t TO REGISTER
MDCL t,	TO INSTRUCT TO ALLOCATE INTERMEDIATE TERMS/ VARIABLES DESIGNATED WITH t TO MEMORY

FIG. 8

```
(1)
         t1 := &X
 (2)
         t2 := [
 (3)
         t3 := 4
 (4)
(5)
(6)
         t4 := t2 * t3
         t5 :- t1 + t4
( 6)
( 7)
         t6 := 1
                                        ~ (B1)
         mem(t5) = t6
 (8)
         t7 := [
 (9)
         t8 := 20
 (10)
         t9 := t7 > t8
(11)
         if false then goto L2
(12)
(13)
        ≟i:
         t10 := &X
 (14)
         t11 := J
(15)
         112 .= 4
(16)
         t13 := t11 * t12
(17)
         ti4 := t10 + t13
                                         (82)
(18)
         t15 := mem(t14)
(19)
         t16 := J
(20)
         t17 := t15 + t16
(21)
         R := £17
(22)
         goto L3
(23)
(24)
        L2:
        t18 := K
(25)
        t19 := 10
(26)
        t20 := t18 / t19
(27)
         R := t20
(28)
        t21 := &X
(29)
        t22 :: J
        t23 := 4
(3Ü)
                                        - (D3)
(31)
        t24 := L22 * L23
(32)
        t25 := t21 + t24
(33)
        t26 := mem(t25)
(34)
        t27. := R
(35)
        t28 := t26 + t27
(36)
        R := t28
(37)
       L3:
```

FIG. 9

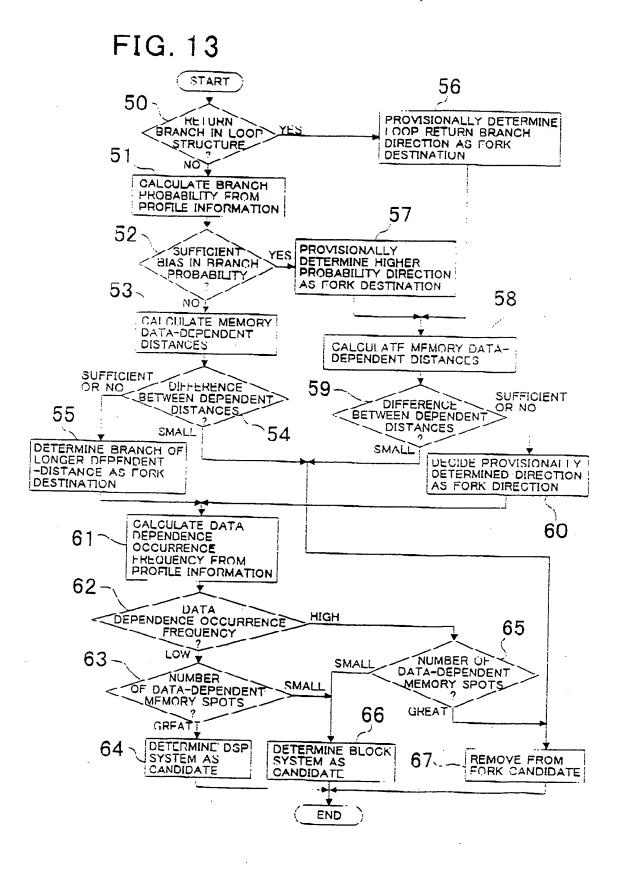
```
(51)
         t1 := &X
(52)
        t? := [
(53)
         t3 := 4
(54)
         t1 := t2 + t3
(55)
        t5 := t1 + t4
(56)
        tG := 1
(57)
        mem(t5) := t6
                                       > (B1)
(58)
         SPFORK L2
(59)
        t7 := i
        t8 = 20
(60)
        t9 :- t7 > t8
(61)
        FTERM
(62)
(63)
        THABORT
(64)
        guio Li
(65)
        L1:
(66)
        t10 := &X
(67)
        t11 := J
(68)
        t12 = 4
(69)
        t13 :- t11 * t12
(70)
        t14 := t10 ÷ t13
                                        ~ (B2)
(71)
        t15 := mem(t14)
(72)
        t16 := J
(73)
        t17 := t15 + t16
(74)
        R := t17
(75)
        goto L3
(78)
       1:2:
(77)
        t18 :- K
(78)
        t19 :- 10
(79)
        t20 := t18 / t19
(80)
        R := L20
        t21 := &X
(81)
        t22 := J
(82)
                                        (B3)
(83)
        t23 := 4
(84)
        t24 := t22 * t23
(85)
        t25 := t21 + t24
(86)
        t26 := mem(t25)
(87)
        t27 := R
(88)
        t28 :- t28 + t27
(89)
        R := t28
(90)
       L3:
```

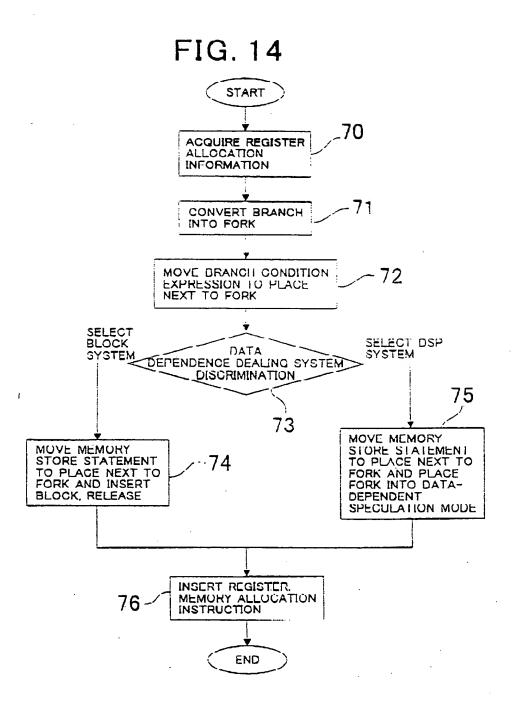
```
(101)
          t1 := &X
 (102)
          t2 := 1
 (103)
          t3 :- 4
 (104)
          t4 := t2 * t3
 (105)
          t5 := t1 + t4
 (100)
          BLOCK t5
 (107)
          SPFORK L2
 (108)
          t6 := 1
 (109)
                                      > (B1)
          mem(t5) := t6
 (110)
          RELEASE t5
 (111)
          t7 := I
 (112)
          t8 := 20
          t9 := t7 > t8
 (113)
 (114)
         FTERM
 (115)
         THABORT
 (116)
         goto LI
 (117)
        L1:
 (118)
         ±10 := &X
 (119)
         t11 := J
 (120)
         t12 := 4
 (121)
         t13 = t11 * t12
 (122)
         114 .= 110 + 113
                                        (B2)
(123)
         t15 := mem(t14)
(124)
         t16 := J
         t17 := t15 | t16
(125)
(126)
         R := t17
(127)
         goto L3
        L2:
(128)
(129)
        t18 := K
        t19 := 10
t20 := t18 / t19
(130)
(131)
(132)
        R := t20
(133)
        t21 := &X
(134)
        t22 := J
                                      > (B3)
(135)
        t23 := 4
        t24 := t22 * t23
(136)
(137)
        t25 := t21 + t24
(138)
        t26 := mem(t25)
(139)
        t27 := R
(140)
        t28 := t26 + t27
(141)
        R := L28
(142)
       L3:
```

FIG. 11

```
(201)
          RDCL t1 - t9
 (202)
          RDCL I
 (203)
         MDCL X
 (204)
         11 .= &X
 (205)
         t2 := 1
         t3 := 4
 (206)
 (207)
         t4 := t2 + t3
 (208)
         t5 = +1 + +4
 (209)
         BLOCK t5
 (210)
         SPFORK L2
                                      - (B1)
 (211)
         t6 := 1
 (212)
         mem(t5) := t6
 (213)
         RELEASE t5
 (214)
         ₹7 := [
         t8 = 20
t9 = t7 > t8
(215)
(216)
(217)
         FTERM
 (218)
         THABORT
 (219)
         goto L1
(220)
         L1:
(221)
         RDCL t10 - t17
 (222)
         RDCL R
(223)
         MDCL X . J
(224)
         +10 = 2X
         t11 :- J
t12 :- 1
(225)
(226)
                                       (B2)
(227)
         t13 := t11 * t12
(228)
         t14 := L10 + L13
(229)
         t15 := mem(t14)
(230)
         t16 := J
(231)
         t17 := t15 + t16
(232)
         R := t17
(233)
         goto L3
(234)
        L2:
(235)
         KUCL t18 - t28
(236)
         RDCL R
(237)
         MDCL X , J
(238)
         t18 := K
(239)
         t10 := 10
(240)
        t20 := t18 / t19
         R := t20
(241)
(212)
        t21 := &X
                                      (R3)
(243)
        t22 := J
(244)
        L23 := 4
(245)
        t24 := t22 * t23
(246)
        t25 = t21 + t24
(247)
        t26 := mem(t25)
(248)
        t27 := R
(249)
        t28 := t26 - t27
(250)
        R := t28
(251)
        L3:
```

```
(255)
          r21 := &X
 (258)
         r22 := r11
 (257)
         r23 := 4
         r24 := r22 * r23
r25 := r21 + r24
 (258)
 (259)
 (280)
         BLOCK r25
         SPFORK L2
 (261)
 (262)
         r26 := 1
         mem(r25) = r26
 (263)
 (264)
         RELEASE r25
 (265)
         -27 := -11
 (266)
         r28 := 20
 (267)
         r29 := r27 > r28
         FTERM r29
 (268)
(269)
         THABORT
 (270)
         goto L1
(271)
        1.1.
(272)
         r20 := &X
(273)
         r21 := mem(&J)
(274)
         r22 := 4
(275)
         r23 := r21 + r22
(276)
         r24 := r20 + r23
(277)
         r25 := mem(r24)
(278)
         r26 := mem(&J)
(279)
         r27 = r25 + r26
(280)
         r12 :- r27
(281)
         goto L3
(282)
        L2:
(283)
        r20 := r13
(284)
         r21 := 10
(285)
         r22 := r20 / r21
(286)
         r12 := r22
(287)
         r23 := &X
(288)
        r24 :- mem(&J)
(289)
        r25 :- 1
(290)
        r26 := r24 * r25
(291)
        127 := 123 + 126
(292)
        r28 := mem(r27)
(293)
        r29 := r12
(294)
        r30 := r28 + r29
(295)
        r12 = r30
(296)
        L3:
```





```
t1 := P
       t2 :- 0
                                    (R11)
       t3 := t1 < t2
       if false goto L2
11.
       t4 := 0
                                    (B12)
       p := +4
ر2:
       t5 := P
      t6 := 15
t/ := t5 > t6
                                    (B13)
      if false goto L4
LJ:
      t8 := 0
                                    (B14)
      o := t8
L4:
      t9 := :
t10 := P
      t11 := t9 << t10
       J := t11
      t12 :- Z
      mem (t12) := t11
      113 := &X
      t14 := ₽
      L15 := 4
      t16 := t14 * t15
t17 := t13 + t16
      ±18 = mem(±17)
                                  > (B15)
      t19 := J
      t20 := t18 + t19
      mem(t17) := t20
      K := t20
      t21 := &X
      t22 := H
t23 := 4
      t24 := t22 * t23
t25 := t21 + t24
      t26 := mem(t25)
      t27 := 9
      t28 := t26 > t27
      if false goto L6
L5:
      t29 := &X
      t30 := P
      t31 := 4
t32 := t30 * t31
                                   - (B16)
      t33 := t29 + t32
      t34 := mem(t33)
      t35 := 1
      t38 := t34 - t35
      mem(t33) := t36
LG.
     †37 '= &Y
     t38 := P
      t39 := 4
     t40 = t38 + t39
                                   (B17)
     t41 := t37 + t40
     t42 := mem(t41)
     t43 := K
     t44 := t42 + t43
      J := t44
```

FIG. 16(A)

BRANCHING NUMBER

B I1	B 12: 2D	B 13- 18D
B 13	B 14: 3D	B 15: 17D
B 15	B 16: 3D	B 17: 17D

FIG. 16(B)

MEMORY DATA DEPENDENCE

B 15 → B 16	I2D
B 15 → R 17	4

```
RDCL t1 - t3
SPFORK L2
                                                                   t.18 := mem(t.17)
                                                                   t10 := J
         tl := [
                                                                  t20 := t18 + t19
mem(t17) := t20
K := t20
         tl := 0
                                              (B11)
         t3 := t1 < t2
         FTERM ±3
THABORT
                                                                  DSPOUT
                                                                   t21 := &X
         goto Li
                                                                  t22 := P
t23 := 4
                                                                                                            (B15)
LI:
         RDCL ±4 . P
                                                                  124 .= 122 ÷ t23
t25 := t21 + t24
                                             (B12)
         t4 :- 0
P := +4
                                                                  t26 := mem(t25)
L2:
                                                                  t27: = 3
t28: = t26 > t27
         RDCL t5 - t7
SPFORK L1
                                                                  FTERM t29
        t5 := P
t6 := 15
t7 := t5 > t6
FTERM t7
                                             (B13)
                                                          L5:
                                                                  RDCL t29 - t36 . P
MDCL X
L29 .= &X
t30 := P
         THABORT
        goto L3
1.3
                                                                  t31 := 4
        RDCL t9 . P
                                                                                                           (B16)
                                                                  t32 := t30 * t31
t33 := t29 + t32
                                             (B14)
        t8 := 0
P := t8
                                                                  t34 :- mem(t33)
t35 := 1
L4:
        RDCL t9 - t28 , J , P MDCL K , X , Z
                                                                  t36 := t34 - t35
                                                                  mem(t33) := t36
        t9 := 1
t10 := P
t11 := t9 << t10
                                                          ∟6:
                                                                  RDCL t37 - t47 , J , P
MDCL K , Y , Z
t37 := &Y
t38 := P
        J := ±11
DSPIN
        SPFORK L6
                                             (B15)
                                                                  t39 := 4
                                                                  t40 := t38 + t39
t41 := t37 + t40
        mem(t12) := t||1
       t13 := &X
L14 := P
t16 := t14 * t15
                                                                                                            (D17)
                                                                  t42 := mcm(t41)
                                                                 t43 := K
t41 := t42 + t43
t45 := &Z
       t17 := t13 + t16
                                                                  t46 := mem(t45)
                                                                 t47 := t44 + t46
                                                                  J := t4/
```

FIG. 18

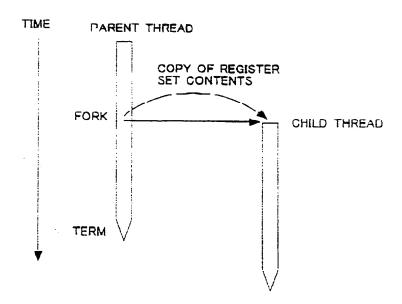


FIG. 19

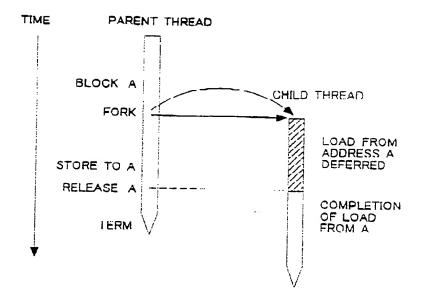


FIG. 20(A)

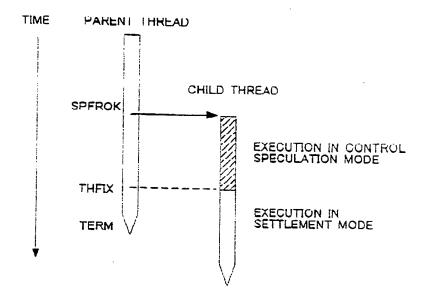


FIG. 20(B)

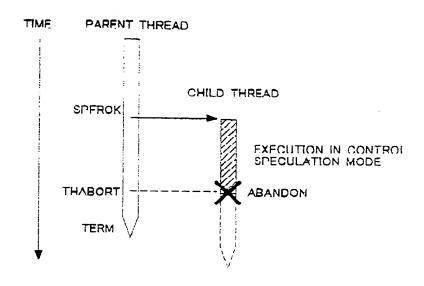
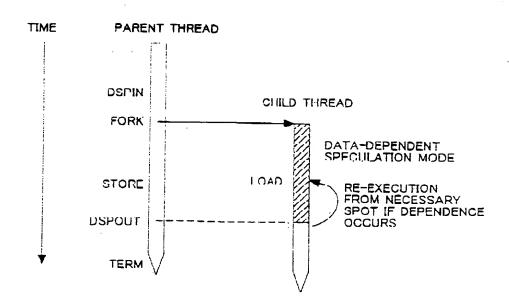


FIG. 21



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